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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,328	12/31/2003	Feng Xie	590282001100	7598

25226 7590 11/28/2007

MORRISON & FOERSTER LLP
755 PAGE MILL RD
PALO ALTO, CA 94304-1018

EXAMINER	
BROOME, SAID A	
ART UNIT	**PAPER NUMBER**
2628	
MAIL DATE	**DELIVERY MODE**
11/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/751,328	Applicant(s) XIE ET AL.	
	Examiner Said Broome	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-4,14,15 and 17-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-4,14,15 and 17-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to an amendment filed 10/5/2007.

2. Claims 2, 3, 14, 15, 23 and 24 have been amended by the applicant.

3. Claims 1, 5-13, 16 and 25-36 have been cancelled.

3. Claims 4 and 17-22 are original.

The indicated allowability of claims 17-22 is withdrawn in view of the newly discovered reference(s) Koshiba et al.(US Patent 6,040,840). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 101

Claim 23 is rejected under 35 U.S.C. 101 because the claim contain a computer program, which is non-statutory subject matter. A program must be recited as "a computer-readable medium encoded with a computer program" in order to be considered statutory subject matter. Similarly, computer programs claimed as computer listings per se, i.e., the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer

program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035. Accordingly, it is important to distinguish claims that define descriptive material per se from claims that define statutory inventions.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17-19, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cornish et al.(hereinafter "Cornish", "*View-Dependent Particles for Interactive Non-Photorealistic Rendering*") in view of Blinn (US Patent 6,184,891) in further view of Koshiba et al.(hereinafter "Koshiba", US Patent 6,040,840).

Regarding claim 19, Cornish teaches a computer-implemented method to produce a particle image to be combined with a second image (abstract lines 3-6: "*...we represent the model as a system of particles, which will be rendered as strokes in the final image and which may optionally overlay a polygonal surface.*"), where the particles are combined with the geometric object, which would be implemented in animation (abstract lines 7-13: "*Our primary contribution is...to regulate the number and placement of these particles...and ensuring inter-frame coherence in animated or interactive rendering.*") . Cornish teaches generating a plurality of cutout particles, each cutout particle

corresponding to a geometric object in the scene description (sec. 1.1 lines 1-13: "*View-dependent particles provide an efficient multiresolution structure for fine-grained control over the placement of strokes, and can be generated from any polygonal model.*"), where particles are associated with 3D models taken from a scene. Cornish also teaches displaying the composited image on a display (abstract lines 3-6). However, Cornish fails to teach computing a list of overage layers and determining the color of the pixels based on their associated coverage layer list. Blinn teaches computing a list of coverage layers for the pixel (col. 6 lines 66-67 – col. 7 lines 1-3: "*The method for simulating fog described above can be used in complex scenes with several layers of objects and fog…fog enclosing objects in a graphics scene can be modeled with fog layers.*" and in col. 4 lines 30-36: "*…this fog method is applied after computing the color of the pixel being fogged. The fogged pixel can then be composited with another pixel at the same location. This method applies particularly well to a layered graphics rendering pipeline where geometry in a graphics scene is rendered to separate image layers…*"), where each coverage layer in the list of coverage layers includes an accumulated color value due to one or more particles of a particle system and an amount occluded by one or more of the cutout particles (col. 3 lines 10-12: "*The fog is represented as a scattering of dots (e.g., 48) of color F and an amount f(z) corresponding to the fog between the viewpoint and the depth value (z) of the pixel.*" and in col. 10 lines 58-61: "*When placed over the background color F, the proper amount of f shows through to account for the fog color in front of A, i.e. fF, as well as the amount of fog peeking through the fogged A…*"), where several coverage layers are produced for the pixels in the scene, where each image layer includes the contributing color values based on the visibility of the pixels occluded by the

particles of fog. Blinn also teaches computing a depth map for the image (col. 20 lines 30-31), where depth values for the pixels in the image are calculated, and also teaches computing particles for entries from a depth map at a particular depth (col. 1 lines 42-43: "*...the fog...is...calculated as a function of z, the depth of an object...*" and col. 15 lines 35-40: "*...a primitive partially covers a pixel location...the tiler computes the pixel...using a z-buffer...*"), where the particles have a position in three-dimensional space corresponding to a z value, or depth map entry (col. 9 lines 5-8). However, Cornish and Blinn fail to teach the remaining limitations. Koshiba teaches a particle having a radius in three-dimensional space (Fig. 4: element "r_I") corresponding to a z value, or depth map entry (col. 13 lines 22-23) in 3D space. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cornish, Blinn and Koshiba because this combination would provide accurate rendering of composited particles at a correct depth in the scene through the determination of the color associated with the visible pixels based on the depth and position of the particle in 3D space for accurate display of the particle in the composited image from the determined rendering properties of the image layers.

Regarding claim 17, Cornish fails to teach the limitations. Blinn teaches that each list of coverage layers is generated by processing the particles in order from farthest from a camera position to nearest (col. 8 lines 60-67 – col. 9 lines 1-10: "*...objects like A that are partially occluded by other objects (e.g., B) are fogged using a fog layer having a fog amount f, the fog amount from the viewpoint all the way to A...the fogged objects A and B can be rendered to separate image layers and composited later to construct an output image...*"), where the collection of layers are generated by processing the

particles, or fog, in order of visibility form a camera potion or viewpoint (Fig. 6). The motivation to combine the teachings of Cornish, Blinn and Koshiba is equivalent to the motivation of claim 19.

Regarding claim 18, Cornish fails to teach the limitations. Blinn teaches adding a new coverage layer, or image layer, for a particle from a particle system, such as fog, that follows a cutout particle in the processing (column 9 lines 11-21: "*...simulating fog on two objects A and B can be extended to an arbitrary number of layers of fogged objects. FIG. 6 extends the example in FIG. 5 by adding another object C (170) with a fog layer 172 of amount j in front of C...The new fog layer jF and object C can be overlaid on the combined layer P using the over operator...*"), where a new layer jF is added on top of the existing layer P that contains the visibility and color contribution information of the particles that occlude objects A and B (shown in transition from Fig. 5 to Fig. 6). The motivation to combine the teachings of Cornish, Blinn and Koshiba is equivalent to the motivation of claim 19.

Regarding claims 23 and 24, Cornish teaches implemented rendering an image of particles using OpenGL (pg. 4 rgt. col. 1st ¶ lines 5-8) on a computer system (sec. 4 1st ¶ lines 5-6), therefore the method of rendering an image is implemented on the system using computer program stored on a computer readable medium, as commonly known in the art.

Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cornish in view of Blinn in further view of Koshiba and in further view of Curtis ("*Non-Photorealistic Animation*")

Regarding claim 2, Cornish, Blinn and Koshiba fail to teach the limitations. Curtis teaches rendering the geometric objects to produce a depth map (pg. 15 appendix A 1st ¶ lines 1-3: "*...draws the visible silhouette edges of a 3-D model using image processing and a stochastic, physically-based particle system...it requires only a depth map of the model...*"). Though Curtis does not explicitly teach entries into the depth map, it would have been obvious to one of ordinary skill in the art at the time of invention that a depth map contains entries from each pixel that visually represents the depth of points in the image (Figs. A1 and B1). Curtis also teaches generating cutout particles from at least some of the entries in the depth map, each cutout particle corresponding to an entry in the depth map in three-dimensional space (pg. 15 appendix A 1st ¶ lines 1-3 –4th ¶ lines 1-3: "*For input, it requires only a depth map of the model...First, the depth map is converted into two images...Next, particles are generated, one at a time, for a fixed number of particles...*"). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cornish, Blinn, Koshiba and Curtis because this combination would provide realistic rendering of particle images through determination of the depth of each pixel within the image thereby eliminating unnecessary processing burden of rendering hidden portions of the object and improving the quality of the image.

Claims 3 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cornish in view of Blinn in further view of Koshiba and in further view of Klassen (US Patent 6,591,020).

Regarding claims 3and 20-22, Cornish fails to teach the limitations. Blinn teaches performing anti-aliasing techniques for the rendered particles of fog (col. 12 lines 12-18: "*...the stages of the graphics rendering pipeline, including traversing the scene database...antialiasing, shading, fog, and texture mapping...are performed by software modules executing on a computer.*"), however Blinn and Koshiba fail to teach that the portions of these particles are generated at a higher resolution where aliasing is likely to occur. Klassen teaches (col. 2 lines 12-19: "*...the edges between the overlapping or abutting objects may appear jagged. Therefore, it is often desirable to antialias these edges...Antialiasing provides the illusion of increased resolution...*"), that portions of an image, including objects represented by z values or portions of the depth map, that present undesired effects, such as aliasing, may be rendered at a higher resolution that the rest of the image, thereby preventing unwanted artifacts in the final image. It would have been obvious to one of ordinary skill in the art to combine the teachings of Cornish, Blinn, Koshiba and Klassen because this combination would provide smooth realistic images by preventing aliasing effects that may present in the image by enabling certain portions of the image to be generated at a higher resolution.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cornish in view of Blinn in further view of Koshiba in further view of Curtis, and in further view of Govindaraju ("*Interactive shadow generation in complex environments*").

Regarding claim 4, Cornish, Blinn, Koshiba and Curtis fail to teach the limitations. Govindaraju teaches generating pixels at a higher resolution at silhouette edges of the depth map (sec. 2.1 3rd ¶ lines 1-2, 7-9: "*Many techniques have been*

proposed to handle aliasing of shadow edges…to increase the effective shadow map resolution in areas where edge aliasing occurs."). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cornish, Blinn, Koshiba, Curtis and Govindaraju this combination would provide a composited image in which the visual depth of the image would be enhanced through the implementation of a depth map image, thereby resulting in an image free of aliasing artifacts through the higher resolution applied to the edges of the depth map image.

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cornish in view of Blinn in further view of Koshiba in further view of Curtis, and in further view of van Wijk ("*Rendering Surface-Particles*").

Regarding claims 14 and 15, Cornish Blinn, Koshiba and Curtis fail to teach the limitations. Van Wijk teaches computing a depth of field adjustment (sec. 4.3 1st ¶ lines 8-11: "*…a more flexible technique would be welcome that allows the user to focus on areas of interest…*" and pg. 60 sec. 4.3 2nd ¶ lines 1-3: "*The effect of depth of field as a tool for the selection of interesting areas is the strongest f put under user control.*"), and a motion blur adjustment (pg. 58 sec. 4.1 right column 2nd ¶ lines 8-10: "*Motion blurs turns the images of the particles in short lines…*"), for a particle. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cornish, Blinn, Koshiba, Curtis and van Wijk because this combination would provide a reduction in distortedly rendered particles present in images composed of particles and geometric models through enabling adjustment of distorted areas.

Response to Arguments

The applicant states on pg. 1 3rd ¶ lines 1-2 of the remarks that claims have been amended to depend from claim 19, however the indicated allowability of claims 17-22 in the previous office action is withdrawn in view of the newly discovered reference(s) Koshiba et al.(US Patent 6,040,840).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on M-F 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Said Broome/
Art Unit 2628
11/21/07

Xiao Wu

XIAO WU
SUPERVISORY PATENT EXAMINER